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ARTICLE XIV.

Contributions to the Geology of the Tertiary Formations of Virginia.
—Second Series—Continued: *Being a Description of several Species of Miocene and Eocene Shells, not before described.* By William B. Rogers, Professor of Natural Philosophy in the University of Virginia, and Henry D. Rogers, Professor of Geology and Mineralogy in the University of Pennsylvania. Read March 3, 1837.

Turritella fluxionalis.

Specific character.—Shell elongated, turrited, whorls about twelve, slightly convex, subcarinated at base, longitudinally striated with five principal hardly granulated revolving striæ, the lowest being double, between these are very fine ones, most numerous towards the base of the whorl. Very obtuse nearly obsolete transverse striæ give to the principal longitudinal stria a sub-granulated undulation. Aperture sub-quadrangular. Length, one inch and two-tenths.

Locality, Williamsburg and the neighbourhood, in the miocene of eastern Virginia.

Description.—This delicately striated shell has two of its finer class of lines separating the two stronger threads of the first, or carinal stria, about six of them between this and the second, about five between the second and third, either two or three between the third and fourth,

one between the fourth and fifth, and from the fifth or uppermost to the top of the whorl about two more occur. It is the most convex in its whorls of all our meiocene *Turritellæ*, if we except the *T. variabilis*, and from this it may readily be distinguished by the greater number, delicacy and remoteness of its principal longitudinal striæ.

Cytherea lenticularis. Plate XXVIII., fig. 1.

Specific character.—Shell large, depressed, discoidal, rather thick, length nearly equal to the breadth; transversely striated; lunule long, ovate, obscurely defined by a very faint impressed line; umbones rather depressed; beaks small, hardly recurved; teeth straight, divergent; cavity of the shell not deep; margin entire. Diameter about two inches.

Locality, eastern Virginia, in the eocene, where it is a common species.

Remarks.—From the extreme friability of this shell it has been impossible, hitherto, to procure a perfect specimen. It differs from all the *Cythereæ* of our American eocene beds in its nearly orbicular form, and in its slight degree of inflation. The insulated tooth of the right valve is long, straight, and not much elevated. The anterior cardinal tooth in the same valve is slightly bifid. The striæ upon the surface of the disc are almost obsolete, where decay has not removed the external laminæ. The small incurvation in the beaks distinguishes it from *C. Poulsonii* of Conrad (*C. globosa*, Lea), to which species it bears some resemblance.

Cucullea onochela.* Plate XXVIII., fig. 2.

Specific character.—Shell ovate, subtrigonal, subcordate, oblique, the anterior margin nearly straight, inequilateral, inequivalve, thick, ponderous, globose; longitudinal costæ numerous, depressed and flat, upon the left valve obsolete; transverse striæ minute, obscure, except near the inferior margin; hinge line very straight; umbones not very pro-

* From its resemblance to an ass's hoof.

minent; beaks small, slightly incurved, and not distant. Length equal to the breadth, three inches.

Locality, western part of the peninsula of the Potomac and Rappahannock, Virginia, in the eocene.

Description.—Alternate longitudinal striæ, very obscure and delicate, divide many of the costæ along the centre, and throw them, especially next the anterior side, into pairs. The beak has four-sevenths of the length of the hinge on its posterior side. This species may be known from the *C. incerta* of Deshayes by its much greater size, its less quadrangular form, by the greater number of its lateral teeth, and the less incurvation of its beaks. It is not less readily distinguished from *C. gigantea*, a species prevailing in the same beds with it, by its less width, compared to its height, by the less obliquity and greater length of its posterior margin, by the beaks being less remote and less incurved, and by the shell being smaller, but materially thicker, and more inflated near the base. A prominent feature is the great inflation of the valves, especially towards their base. The hinge is well marked by from four to five lateral teeth, next the posterior side, and from three to four next the anterior, all being slightly curved, striated by deep irregular grooves on their sides, and of nearly equal obliquity. The central longitudinal teeth are numerous, irregular, and slightly oblique. The area of the ligament is nearly a segment of a circle, the straight hinge line being the chord; its surface is marked by about six deep, rather waved grooves. The right valve is the largest, overlapping the left on the lower margin, which is moderately crenulated in both. In the cabinet of the Academy of Natural Sciences of Philadelphia there are, besides three large casts of *C. gigantea*, two apparently of the present species, somewhat larger than the shell now described. These latter, I have satisfied myself, belong to *C. onochela*, as an internal cast of this made in wax is precisely like them, though very different from the casts of *C. gigantea*.

Cucullea transversa. Plate XXIX., fig. 1.

Specific character.—Shell subovate, subtrapeziform, oblong, oblique, inequilateral, inequivalve; longitudinal striæ numerous and delicate,

the alternate ones nearly obsolete, dividing the costæ into pairs; transverse striæ very minute; hinge straight, area of ligament narrow, with from three to four furrows; beaks small, somewhat incurved, and not distant. Length four-fifths of the breadth, but these proportions variable.

Locality, King George county, Virginia, in the eocene, near the Potomac river.

Description.—The division of the costæ into pairs, the great obliquity of the posterior margin, and its great breadth, are among the characteristics of this shell. The area of the ligament rises from the hinge at a more obtuse angle next the anterior side than at the posterior, so that it curves upon an axis not coincident with the hinge line. The transverse lateral teeth are very slightly oblique, they are on the anterior side three, and on the posterior four; fine acute grooves or striæ mark both sides of these teeth. The central longitudinal teeth are few, irregular and rather oblique. The anterior and inferior margins of the right valve, especially, are strongly crenulated on the inner edge. The anterior muscular impression is subtriangular and depressed, the posterior one is nearly rectangular, the inner angle being a little elevated. Shell moderately thick.

Venericardia ascia. Plate XXIX., fig. 2.

Specific character.—Shell subovate, subcordate, not thick; costæ much depressed except on the beak; about thirty; transverse striæ numerous from the margin to the umbones, nearly obliterating some of the longitudinal sulci; lunule profound, subcordate, triangular and equilateral; anterior muscular impression rather remote from the hinge; cardinal teeth arcuated, oblique; inferior and posterior margins crenulated. Length, three inches two-tenths; breadth, three inches six-tenths.

Locality, King George county, Virginia, near the Potomac, in the eocene.

Remarks.—This shell can be confounded only with the *V. planicosta*, to which it is possible we ought to refer it as a variety. They

are readily distinguished, however, by the greater length and curvature of the whole anterior margin, especially the portion along the ligament; the hinge is broader and longer, and the teeth are less prominent and more arcuated; the muscular impression, on the anterior side, is further from the hinge; and the whole valve is wider, flatter and thinner. These differences, with the flatness of the costæ, appear to warrant us in regarding this shell as a distinct species from *Venericardia planicosta*. That shell also is found in the eocene of Virginia, but usually not in the same bed with *V. ascia*.

Cardium quadrans. Plate XXX., fig. 1.

Specific character.—Shell subtrapeziform, oblique, inequilateral, posteriorly much expanded, compressed anteriorly; thin and fragile; longitudinally ribbed, costæ about thirty-five, broad, depressed, and slightly convex; transverse striæ somewhat coarse or squamose near the margin. Umbones small, beaks incurved, lunule long; posterior cardinal tooth small, and of nearly uniform breadth, posterior lateral tooth large; margin crenulated by distinct but not deep undulations. Length, three inches seven-tenths; breadth, two inches eight-tenths.

Locality, eastern Virginia, meiocene.

Remarks.—Owing to the extremely friable state in which this fossil is found, and to its being associated with *C. magnum* and *C. laqueatum*, its fragments have passed for these species; but its trapezoidal form, and the great width and depression of the longitudinal costæ, show a strong contrast to the *laqueatum*, while, in addition, its less size and less inflation prove it different from the *magnum*.

The great expansion of the posterior slope into an almost auriculated margin, is highly distinctive of it as a new species.

Crassatella capri-cranium. Plate XXX., fig. 2.

Specific character.—Shell ovate, oblong, compressed, sub-rostrate, rather thin, with coarse, obtuse, transverse wrinkles, and fine transverse striæ; a prominent sinus extends from the beak to the anterior termination of the inferior margin; truncated anteriorly, at a right angle

to the base; margin slightly concave at the lunule, which is deep, wide and ovate; inferior margin delicately crenulated within. Length, one inch four-tenths; breadth, two inches two-tenths.

Locality, peninsula, between the Potomac and Rappahannock rivers, in Virginia, in the eocene.

Remarks.—This species may readily be distinguished from the *C. melina*, which it somewhat resembles, by its less thickness, and by the crenulation on its inner margin, but especially by its different outline being much more contracted on its anterior side.

Fasciolaria rhomboidea. Plate XXX., fig. 3.

Specific character.—Shell turritid, fusiform, and nearly smooth, greatest dilatation about the middle, spire conical, whorls convex, with longitudinal, obsolete or interrupted striæ, the lower seven or eight upon the body whorl, and those upon the upper whorls, being distinct and slightly undulated. On the body whorl are ten or eleven very faint, brown, narrow, longitudinal lines, three of which are traceable upon the spire. Transverse striæ, distinct, moderately distant, and arcuated. Aperture a little less than two-thirds the length of the shell, columella arcuated, plicated with three very oblique folds, the middle one the most elevated, labium delicately striated within the edge, beak slightly recurved. Length, two inches four-tenths; breadth, one inch two-tenths.

Locality, Surrey county, Virginia, miocene.

Description.—This is a thin shell, though not difficult to procure entire. From the *F. mutabilis*, the only other species of our tertiary, it will readily be known by the greater length and arcuation of its beak, by its less regularly fusiform outline, and by the difference in the number of its whorls, and of the plications on the columella. The high preservation of the specimen from which the description has been taken, permits us to trace upon its whorls its longitudinal coloured bands, affording a very interesting specific character.

DESCRIPTION OF THE PLATES.

PLATE XXVI.

- Figure 1. *Turritella ter-striata*.
Figure 2. *Turritella quadri-striata*.
Figure 3. *Natica perspectiva*.
Figure 4. *Fissurella catilliformis*.
Figure 5. *Arca protracta*.
Figure 6. *Lucina speciosa*.
Figure 7. *Venus cortinaria*.

PLATE XXVII.

- Figure 1. *Ostrea sinuosa*.
Figure 2. *Cytherea ovata*.

PLATE XXVIII.

- Figure 1. *Cytherea lenticularis*.
Figure 2. *Cucullea onochela*.

PLATE XXIX.

- Figure 1. *Cucullea transversa*.
Figure 2. *Venericardia ascia*.

PLATE XXX.

- Figure 1. *Cardium quadrans*.
Figure 2. *Crassatella capri-cranium*.
Figure 3. *Fasciolaria rhomboidea*.

Plate XXVI.

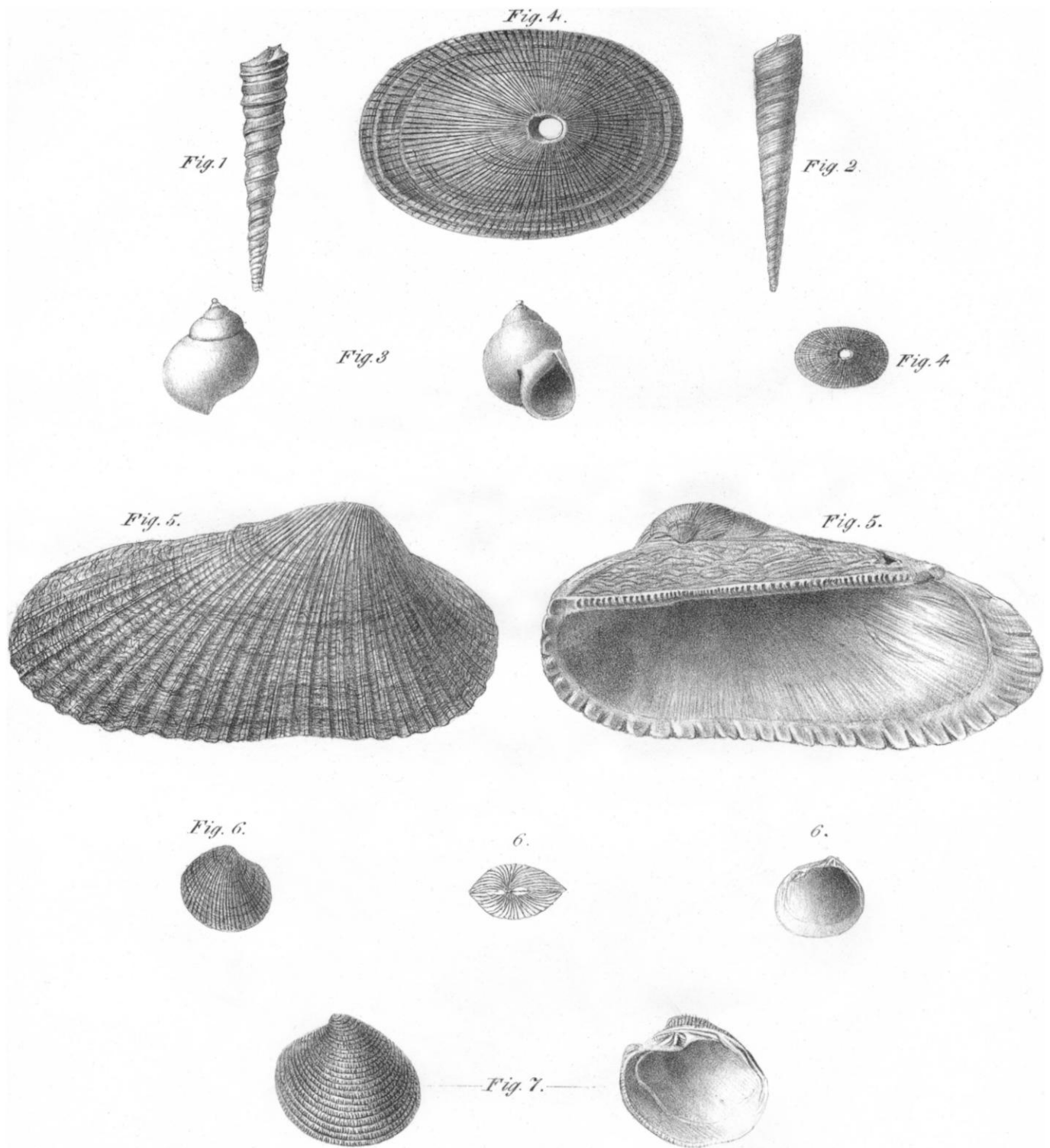


Fig. 1. Turritella ter-striata.

" 2. *Turritella quadri-striata*

" 3. *Natica perspectiva*

" 4. *Fissurella caditiformis*

Fig. 5. Arca protrada

" 6. *Lucina speciosa*

" 7. *Venus cortinaria.*

Fig. 1.

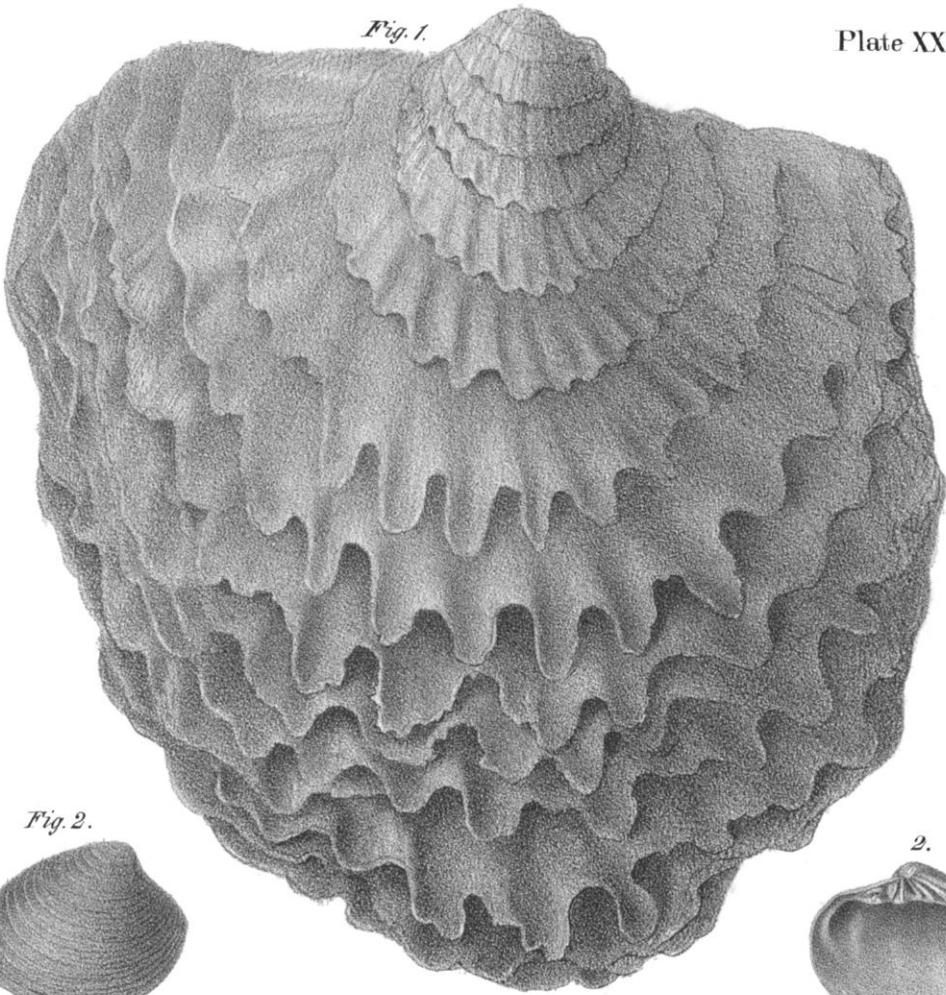


Fig. 2.



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Fig. 1.

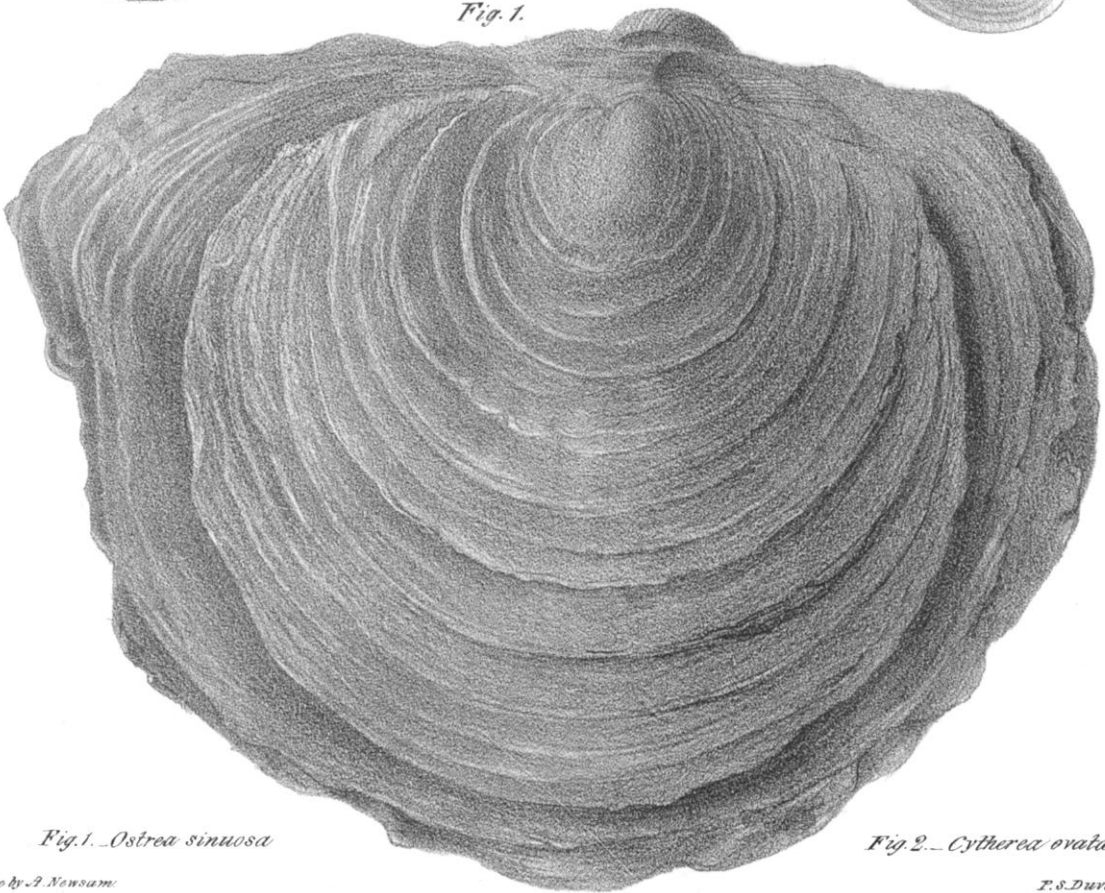
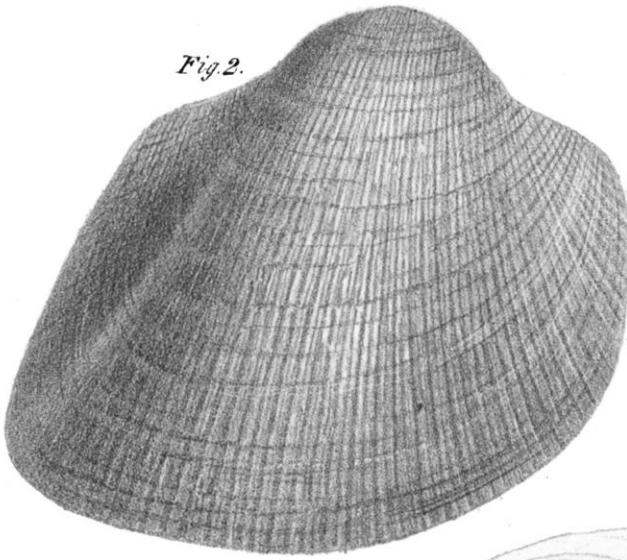


Fig. 1. Ostrea sinuosa

Fig. 2. Cytherea ovata.

Fig. 2.



2.

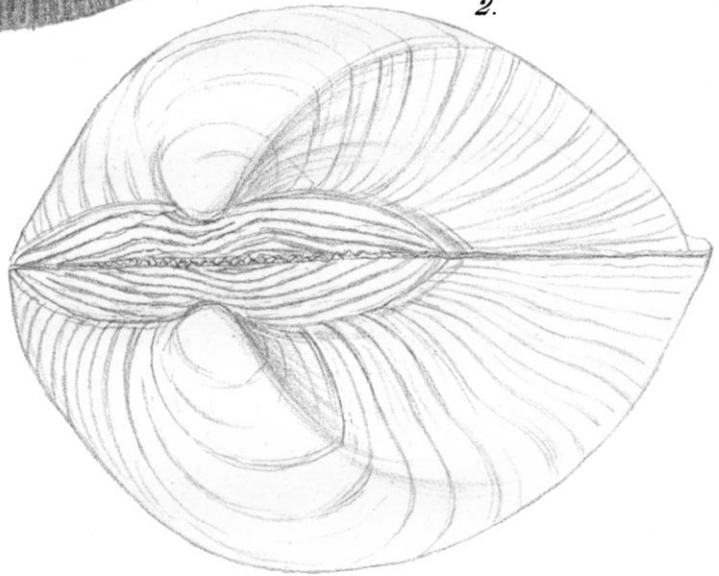
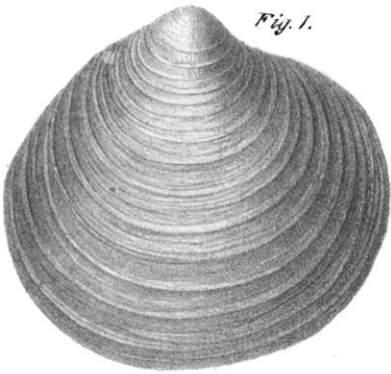
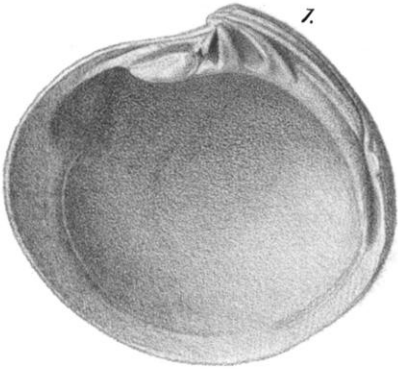


Fig. 1.



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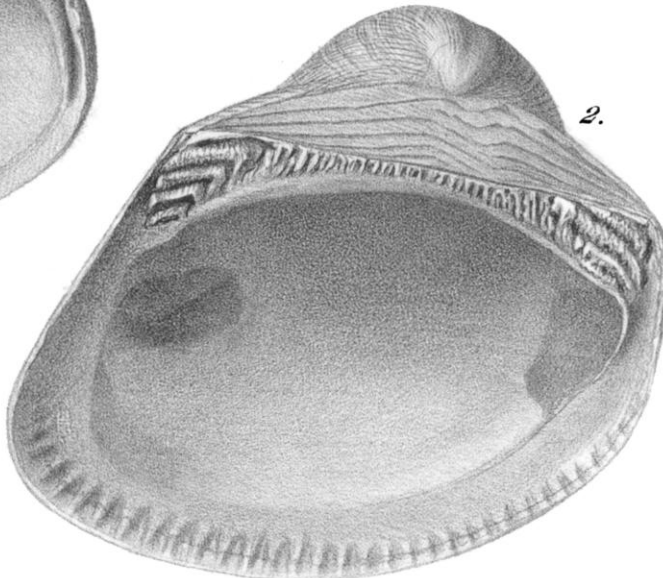


Fig. 1 *Cytherea lenticularis*.
" 2. *Cucullea onochela*.

Fig. 1.

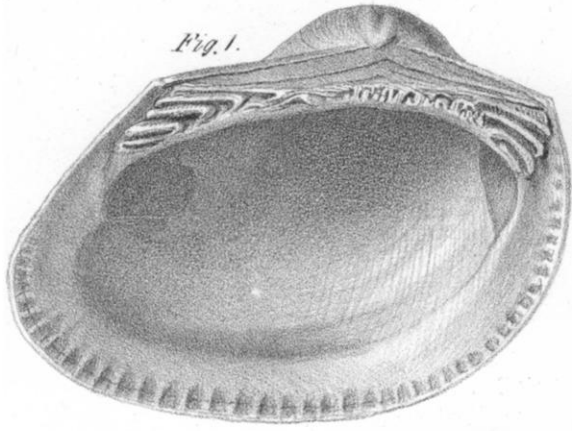
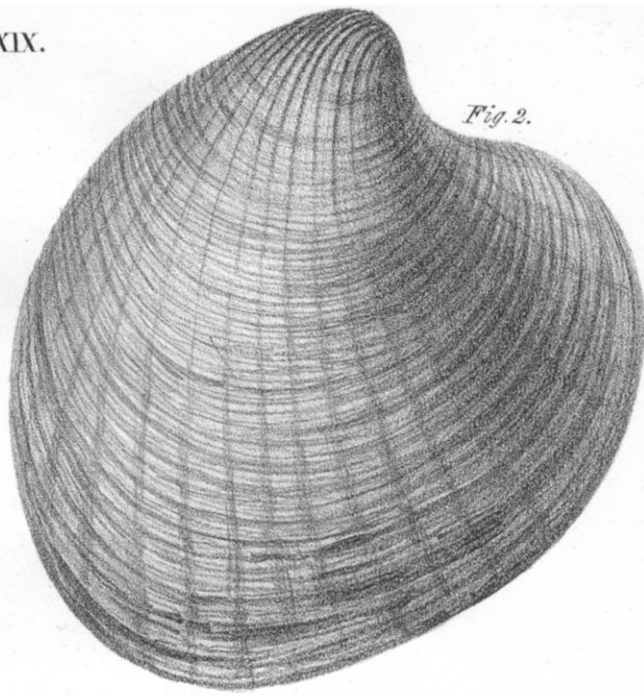
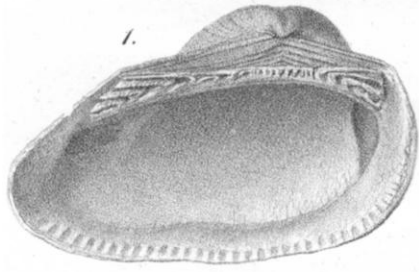


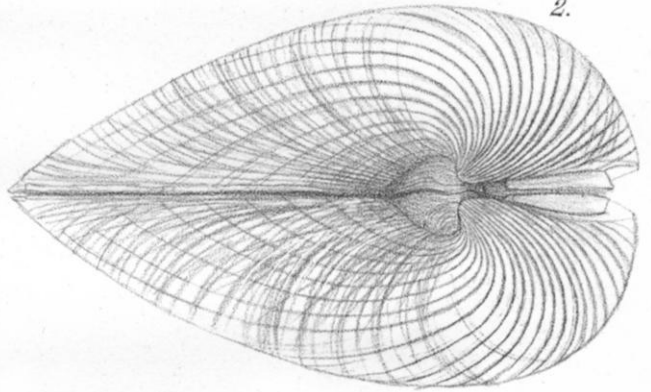
Fig. 2.



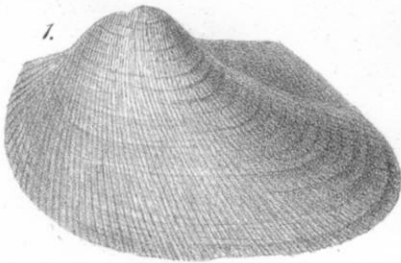
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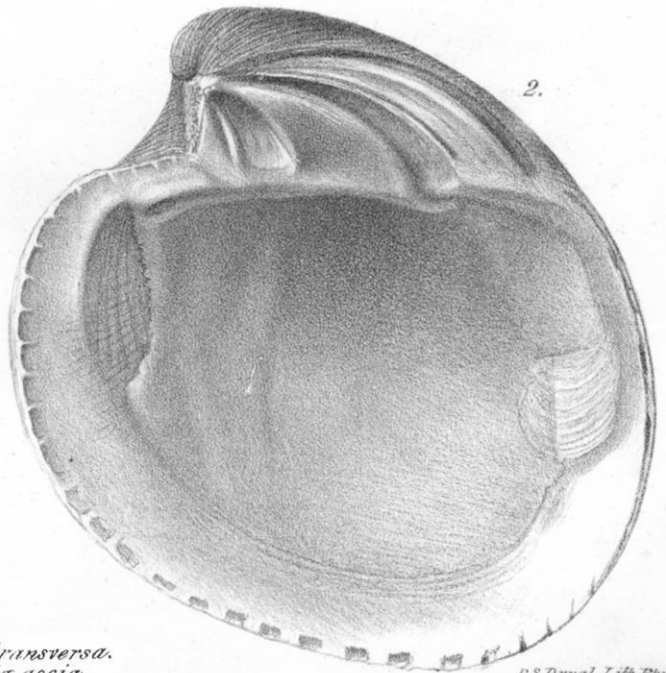
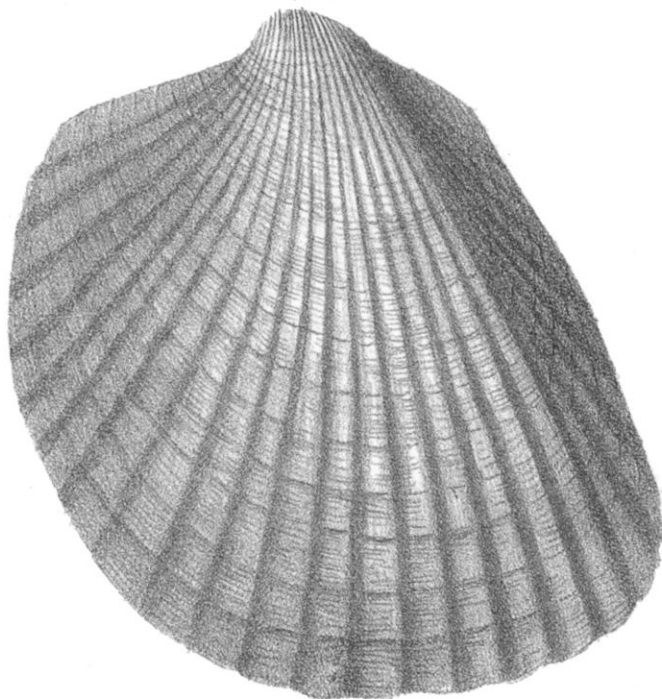


Fig. 1. *Cucullia transversa*.
2. *Venericardia ascia*.

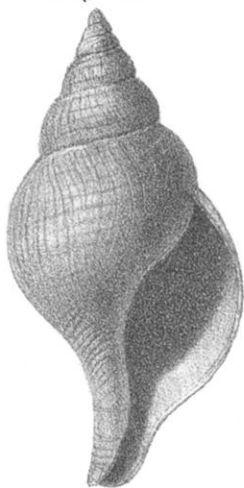
Fig. 1.



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Fig. 3.



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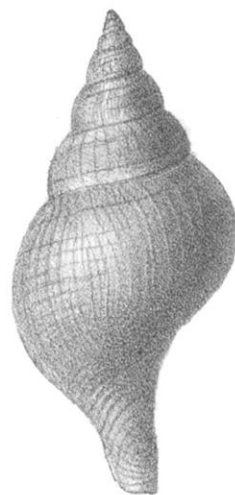


Fig. 2



2

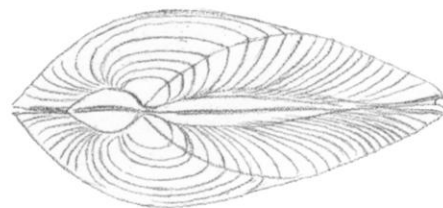


Fig. 1. *Cardium quadrans*.
 " 2. *Crassatella capri-cranium*.
 " 3. *Fasciolaria rhomboidea*.